Solar cell orientation control

Why is molecular orientation important in organic solar cells?
The regulation principle of optimizing molecular orientation is revealed. The morphological characteristics of the active layer in organic solar cells (OSCs),encompassing phase separation structure,domain sizes,crystallinity and molecular orientation play a pivotal role in governing the photoelectric conversion processes.

Do photovoltaic materials have a 'face-on' molecular orientation?
A "face-on" molecular orientation is essential for photovoltaic materialswith efficient vertical carrier transport,but understanding how the molecular structures control their orientations remains challenging.

How do polymer solar cells perform?
The photovoltaic performanceof polymer solar cells (PSCs) depends largely on the ordering structures (i.e.,backbone orientation and crystallinity) of the active-layer molecules. It is crucial to make the molecules adopt a face-on orientation for efficient vertical carrier transport.

Can crystal orientation be controlled in perovskite polycrystalline films?
However,there are few reportson the effective control of crystal orientation in perovskite polycrystalline films. This is because the rapid crystallization process of perovskite polycrystalline films makes it difficult to be accurately controlled compared to the slow growth of perovskite single crystals in solution.

Does side-chain engineering control molecular orientation?
It is crucial to make the molecules adopt a face-on orientation for efficient vertical carrier transport. However,the driving force that directs face-on or edge-on orientation is not yet clear,and the control of molecular orientation by side-chain engineering remains challenging.

What is morphology control in polymer solar cells?
Aggregation and morphology control enables multiple cases of high-efficiency polymer solar cells. Single-junction polymer solar cells with high efficiency and photovoltage. A chlorinated ?-conjugated polymer donor for efficient organic solar cells. An electron acceptor challenging fullerenes for efficient polymer solar cells.

Improving the power conversion efficiency of polymer-based bulk-heterojunction solar cells is a critical issue. Here, we show that high efficiencies of ~10% can be obtained using the crystalline ...

factors is the molecular orientation of donors and acceptors with respect to the electrodes, which is essential to carrier transport in the vertical direction, and ... we report a novel approach to improve solar cell efficiency via control of the molec-ular ordering of COi8DFIC in its binary photovoltaic blend with poly([2,60-4,8-di(5-

The power conversion efficiency of organic solar cells (OSCs) is exceeding 20%, an advance in which morphology optimization has played a significant role. It is generally accepted that the ...

The exclusive orientation of a singular perovskite facet during crystallization can lead to significant strain accumulation in solution-processed films, compromising the performance of perovskite solar cells (PSCs). To address this issue, we propose a facet-complementarity strategy through crystallization modulation utilizing a formamidine-based ...

The photovoltaic properties of solar cells are largely determined by the orientation of the absorber layers, thus, controlling thin film orientation is the key method to enhance the photovoltaic ...

The relative orientation of an electron donor and electron acceptor, which significantly affects charge photogeneration in an organic solar cell, is investigated here. The effects of the molecular ...

Here, we show that high efficiencies of ~10% can be obtained using the crystalline polymer PNTz4T in single-junction inverted cells with a thick active layer having a ...

In terms of the orientation control and the solar cell efficiency improvement, selenization has been performed on Mo/W/Pb substrates to induce highly [001]-oriented (Sb 4 Se 6) n ribbons. As a result, a significant improvement in the device''s performance is achieved.

The external quantum efficiency (EQE) spectra of the control and target devices are compared in Figure 4 C, the slight enhancement of EQE value could be attributed to the passivation of the buried interface via S-Sn coordination. 55 Besides, the V OC of the solar cell is determined by the electron and hole quasi-Fermi level splitting (QFLS) within the light ...

To employ this quasi-1D material for solar cells, the orientation control of Sb2S3 films is very important. In this Letter, we employ the scalable close-spaced sublimation (CSS) method to deposit ...

A "face-on" molecular orientation is essential for photovoltaic materials with efficient vertical carrier transport, but understanding how the molecular structures control their orientations remains challenging. Based on a ladder-type fused-ring core without sp3-hybridized bridging atoms, novel acceptor-donor-acceptor (A-D-A or ADA)-type nonfullerene acceptors (M3 and ...

4 ???· Carrier transport and recombination at the buried interface have hindered the development of inverted perovskite solar cells. Here, the authors employ a linker to reconstruct ...

Perovskite solar cells (PSCs) have drawn significant attention due to their skyrocketed power conversion efficiency (PCE). Crystallization orientation and the buried interface have been proven to be key factors determining the efficiency of PSCs. Herein, we developed a bifunctional ligand 2-(methylthio) ethylamine hydrochloride (METEAM), concomitantly realized ...

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However, BTI polymers have rarely been revisited since organic solar cells (OSCs) entered the era of non-fullerene electron acceptors (NFEA) likely owing to their incompatibility with NFEAs. Herein, fine-tuning the ...

As the incident angle is increased from 0.5° to 8°, the orientation of the vapor-deposited perovskite film (labeled as control film; here, a vapor-deposited film was used as control film since we used vapor evaporation to deposit the upper (001) film for creating the FHJ film) maintains the (001) facet (Figure 2 C).

A "face-on" molecular orientation is essential for photovoltaic materials with efficient vertical carrier transport, but understanding how the molecular structures control their orientations ...

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